





MARYLAND

Agricultural Experiment Station.

---

*FIFTH ANNUAL REPORT.*

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COLLEGE PARK, MD.,

1892.

# MARYLAND

## Agricultural Experiment Station.

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ROBERT H. MILLER, *Director*.  
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JAS. S. ROBINSON, *Horticulturist*.  
ERNEST H. BRINKLEY, *Assistant Agriculturist*.  
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Located on the B. & O. R. R., 8 miles N. of Washington, D. C.

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### NOTICE.

The bulletins of the Station will be mailed free to any citizen of Maryland who sends his name and address to the Station for that purpose.

Correspondents will please notify the Director of changes in their postoffice address, or of any failure to receive the bulletins.

ADDRESS,

COLLEGE PARK,

MARYLAND AGRICULTURAL EXPERIMENT STATION.

College Park, Prince George's County, Md.

January 24th, 1893.

*To His Excellency, Frank Brown,*

*Governor of Maryland:*

DEAR SIR:—

In accordance with the provisions of Section No. 3, of the Act of Congress, "To Establish Agricultural Experiment Stations, etc.," I beg leave to submit my report of the operations of the Maryland Agricultural Experiment Station, for the year ending December 31st, 1892; and also a statement of the receipts and disbursements for the fiscal year ending June 30th, 1892, covering the fifth annual appropriation.

Very respectfully,

ROBERT H. MILLER,

*Director.*



# FIFTH ANNUAL REPORT

— OF THE —

## Maryland Agricultural Experiment Station,

FOR THE YEAR 1892.

### REPORT OF THE DIRECTOR.

My official connection with this Station has covered a period of only two months of this year, having received the appointment as Director in October and entered upon my duties on the first of November; consequently my report will have to be made up, in the main, from the permanent records of the Station, together with notes furnished me by the heads of the several departments.

The present year opened full of promise, with a number of experiments in progress, with facilities for work more complete than at any previous time, and with many plants and trees reaching their maturity and bearing periods; the Winter and Spring months had been made good use of, and the growing season opened with quite a number and variety of experiments, carefully planned and started, but most unfavorable climatic conditions throughout the entire season, resulted in great injury in many instances, and in others in entire failure of crops.

**WEATHER REPORT**—The season of 1892 was phenomenal, and as before stated, most unfavorable to field experiments. The first half of the year had a heavy rain-fall and a mean temperature below the normal.

The second half, or the season when plants make most of their growth and mature, was characterized by a very poorly distributed and low rain-fall, accompanied by long periods of very high temperature. May and June were each marked by severe and destructive hail storms, which did great damage to vegetation, particularly strawberries and other small fruit.

The following is a summary of the rain-fall for this and preceding years at College Park, together with the normal as well as mean temperature and rain-fall for 1892, at Washington, Baltimore, Cumberland and College Park :

YEARS.	1889	1890	1891	1892
Rain-fall in inches.....	59.59	32.29	50.55	41.47
No. of Rainy days.....	135	151	128	137

PLACE OF RECORD.	TEMPERATURE.		RAIN AND SNOW FALL.	
	Normal	Mean for 1892.	Normal in Inches.	In 1892 Inches.
College Park, Md.....	54.1	.....	*46.98	41.47
Washington, D. C .....	54.8	54.1	44.56	42.34
Baltimore, Md.....	55.6	54.1	44.47	45.05
Cumberland, Md.....	51.0	51.9	33.27	34.66

**DRAINAGE**—During the past year, the work of putting in tile, for draining the rotation plots has been completed, and some laid on the plots south of the Station and east of the pike.

The past year has emphasized more strongly than any previous one, the great need of more perfect drainage of this soil for farming purposes, and especially is this necessary for experimental work. The early part of the present year, the soil was full of water, which had the effect of retarding plant growth, in consequence of the cold condition of the soil, and also of restricting the growth of roots and keeping them near the surface; this showed itself quite markedly during the Summer months, by the plants not being able to withstand the hot dry periods.

\*Average of four (4) years.

With a view to the future thorough drainage of a portion of the land which is very wet, a large and capacious open drain has been nearly completed, during the past two months, on the southeast side of the Station property, which we think, with its laterals, will make available a considerable tract of land, which at present is almost useless.

SOIL INVESTIGATIONS.—These were conducted by Professor Milton Whitney, under the same arrangements as last year, up to September 1st; at that time, the Trustees of this Institution saw fit to terminate the contract.

Professor Whitney will report to the State the progress and results of the work up to that time.\*

TOBACCO EXPERIMENTS.—The experiments with Tobacco were conducted much after the principle of last year's work, but in some respects they were more specialized, basing the modifications on the data and results of previous work.

These experiments were planned and supervised by the Chemical Department, and a more detailed description of the year's work, objects, etc., will be given in the report of the Chemist appended herewith.

VARIETY TESTS.—The wheat was sown later than advisable for this place, and not as thick as it should have been if the late sowing must be resorted to; in consequence, there was not the stand that was desirable. The wheat made comparatively a good growth and looked fairly well, but the weather caused premature ripening and the result was small, shriveled grains, and with most of the varieties entire failure.

OATS.—This was a poor season from beginning to end for oats, and but few varieties gave results worth reporting, or that would be fair to them.

POTATO EXPERIMENTS.—These were a repetition of those of former years, on methods of cutting, quality of seed and home-grown *vs.* northern-grown seed. The results were practically the same as last year.

\*Professor Whitney's work will be given in a Bulletin at an early day.



**FERTILIZER TESTS.**—These tests were made with corn, wheat and potatoes. The wheat met the same fate as the variety wheats. The result of the potatoes will be reported in a bulletin.

**FEEDING EXPERIMENTS.**—During the Winter of 1891 and '92 tests of the digestibility and economic feeding value of the different parts of the corn plant were made, using steers in the trial. The results of these tests await the completion of some of the chemical work, before they can be reported.

The feeding work of 1892 and '93 has for its object the testing of a well-balanced ration as compared with a poorly-balanced one. Eight steers are being used for this experiment, weighing when bought, nine hundred and sixty-two pounds average. Four of them are being fed a mixture of crushed corn, cotton-seed meal, bran and turnips; this is fed as chop with cut fodder. The other four are simply fed crushed-corn and turnips with the fodder.

We shall expect this experiment to demonstrate that it will pay the average farmer, who raises principally corn, and who fattens cattle, to buy other feeds, notably cotton-seed meal and mill-feed or bran, to mix with his corn, with a view to having a feed that will be more easily digested, more palatable, and very much more fattening in its effects, and in addition to this the manure resulting, will be very much richer in plant food.

**DAIRY EXPERIMENTS.**—There has been but little dairy work performed at this Station, from the fact that we have not the facilities and means to thoroughly carry out all classes of dairy work. What has been done has been confined to the Chemical Department.

During the year, numerous tests of the quality of the milk of individual animals of herds, and of the milk delivered by patrons of the various creameries in the state, have been made under the direction of the Station, with the object of bringing more forcibly before the farmers and creamery men the fact that there are a great many unprofitable dairy and butter animals in their herds, and to make more prominent the great injustice done to patrons, by paying the same price to all per hundred pounds of milk, regardless of quality.

The improved methods of dairy management and machinery, together with the comparatively cheap artificial ice in our midst, has made the creamery a possibility in every section of the State, and its effects are already seen. To-day we have more than fifty creameries or butter factories doing a successful business and opening up a new industry to the farmers.

The creamery gives an opportunity to many farmers to adopt a more varied class of farming, to turn many crops into more money and, at the same time, to be less exhaustive to the land than the old practices. It scarcely remains any longer a question as to the comparative profitableness of manufacturing our crops into beef, or converting them into butter. Many sections can adopt the creamery system with profit. This station stands ready to help, assist and advise those contemplating going into the industry.

It is our desire to develop the dairy side of our Station work, and we are considering very seriously the advisability of undertaking this the coming year, at any rate in the way of preparing the necessary plant.

HORTICULTURAL DEPARTMENT.—The work of this department has suffered more perhaps than any other from the weather influences, as a result of which many of the experiments were more or less unsatisfactory. The hail storms of May occurred just at the time of the blooming of most of the varieties of strawberries, which cut a large part of the bloom off and injured the vines considerably. In June, we had another hail storm, just as the strawberries were ripening, which ruined any buds remaining after the first storm. These hail storms cut, bruised and broke many of the young trees in the orchards, and damaged them to such an extent that it will take them a long time to recuperate.

PUBLICATIONS.—The Station is behind with several of its publications, but provision has been made, by which these shall be rapidly gotten out and placed in the hands of the farmers.

In the future it will be our policy to publish most of our matter in bulletin form, issue it more frequently, and put but little in the annual report; by so doing we believe that we

shall reach the farmers better than by massing so much matter together at one time, and avoid the tendency to bury much valuable information.

CONDITION OF THE STATION, NEEDS, ETC.—The Station is admirably equipped for the work it is at present engaged in, so far as the plant is concerned, by that being understood the arrangements in and about the buildings, all details having been thoroughly planned with a view to economic and successful operation. But one of the necessary accompaniments, the land, we do not find to be in that state of tilth and heart that is desirable for much of our work, and does not compare at all favorably with land generally throughout the State that is being used for similar purposes.

The want of this condition has been a source of much criticism, and has resulted, we believe, from a failure to obtain sets of grass, which is an essential preliminary to good sods that are so important a factor in all soils, and especially is this the case in lands of this character.

With the object of correcting this condition, it is proposed to adopt a system, which has been found most efficacious wherever tried, which is the application of stable manure, as a top dressing, on all lands set to grass. This not only furnishes the growing plant with the nourishment it most needs but acts as a shade and mulch, which are most important factors in its existence, during the hot summer months.

With the advent of good sods, which we have faith to believe can be secured by the plan suggested, we shall not be so dependent upon climatic conditions, and shall expect better crops and a more reliable system of experimentation.

STATION IMPROVEMENTS.—Part of the annual allowance for buildings for the present fiscal year, ending June 30, 1893, has been used in putting a new iron roof on the barn. The unexpended portion will be devoted to the dairy interest as was suggested, or for the erection of a green house, which will be used to experiment in the forcing of early vegetables and the cultivation of flowers as a business. It is necessary that as many fields as possible be opened up to the Eastern farmer, as a relief from the sharp competition of the West, with its fertile virgin soil. And we believe that there are many, who are

within easy access of the great cities of Washington, Baltimore and Philadelphia, who might engage in this business with profit.

BUREAU OF INFORMATION.—It is our earnest desire to aid the farmer in every possible way in the line of his work, and we wish to call especial attention to the fact that prompt attention will be given to any letters of inquiry that may be received, asking information on any subjects, relating to farm matters. Such letters should be addressed to the member of the Station Staff in whose division the information is desired.

SUGGESTIONS AS TO EXPERIMENTS.—As there are such varied interests represented in our State, it will be impossible for this station to work in all the different fields, but with the view of getting in touch with the farmers, and working along in the line of their interests, I will say that we will be very glad to have suggestions from any farmers in the State, as to the experiments they would like to have made.

We cannot promise to adopt all the suggestions that may come, but we will have the opportunity of selecting those which promise the most of interest and value to the largest number.

VISITORS.—We wish to take this opportunity of saying that we shall be very glad to have any, who are interested in our work, visit us, and we will endeavor to make their stay both interesting and profitable.

Being only half a mile from College Station, on the Baltimore and Ohio Railroad, it will be seen that we are very easy of access.

My acknowledgments are due to the senior member of my staff, Mr. H. J. Patterson, for his kindly and most valuable assistance in preparing this report.

ROBERT H. MILLER,

*Director.*



## REPORT FROM THE CHEMICAL DEPARTMENT.

*To Robert H. Miller, Director:*

SIR:—I herewith hand you the report of the work of this department for the year 1892.

The chemical department during the past year has been occupied chiefly with investigation in relation to tobacco and feeding problems, though considerable time has been given to various other matters, such as milk, marls, fertilizers and miscellaneous plant analyses.

As heretofore, considerable time has been used in the study of methods of analyses, both individually and in co-operation with the Association of Official Agricultural Chemists. These examinations and investigations have involved about two thousand (2,000) single determinations, and considerable work in the keeping of the records and making the necessary calculations of these results, to put them in proper form for report. During the year a number of farmers' institutes and other public meetings have been attended, with talks and exhibits, to explain the application of chemistry in practical farming and dairying as well as in agricultural experiments.

Early in the year I was asked by the committee having charge of the co-operative exhibit of the Experiment Stations of the United States, at the World's Fair, to take part in their work and prepare for them an exhibit to show the composition and digestibility of the principal American feed stuffs. Through the courtesies of the directors of this Station, I have been allowed to do this work in the name of this Station, and have been given the means and facilities for carrying it out. The exhibit is made up on the scale of one hundred (100) pounds, and will represent the following feed stuffs: Turnips, corn silage, corn fodder (stover), timothy hay, clover hay, corn meal, wheat bran and cotton seed meal. This will make a valuable set for our permanent exhibit here, or, if not wanted at this institution, can be disposed of at its full cost to some of the institutions making extensive museum collections of this character.



The special tobacco work conducted during the past two years, has occupied much of the time of this department. During the first five months of this year, the laboratory was almost entirely given up to the analytical work in connection with the tobacco experiments of last year, and which was outlined in the annual report of 1891.

The tobacco work of this year was turned over to this department for it to make the necessary plans and to supervise the work throughout the season. The work was divided into two general branches: First.—Work at the Station. Second.—Outlying work in the principal tobacco counties, at places having typical and representative soils. The work outlined to be done at the Station was divided into the following heads: (1.) The effects of various fertilizing salts on the quality of the tobacco; this was a repetition of the work of last season. (2.) To try to bring up the yield and improve the quality. (3.) Culture tests. (4.) Variety tests. (5.) Curing. (6.) Laboratory work to verify and check field work. The seed-beds were well prepared and we had some fine plants, but the very dry weather and severe heat, which followed immediately after setting out, entirely killed all the plants on the variety and culture test plats, and badly spoiled the set on the fertilizer plats. The plants remaining on the fertilizer plats made but little growth during the Summer, and did not mature early enough to escape the early frosts. Consequently the tobacco work at the Station this year was an entire failure.

The experiments at the outlying points in the several counties were confined to fertilizer tests to bring up the yield without injury and, if possible, to improve the quality. At two points tests of the flue-curing process, as applied to Maryland tobacco, were experimented with. The following are the points which were selected in the several counties at which to locate the tests: Bristol, Anne Arundel County, on the farm of William Henry Hopkins; Mt. Harmony, Calvert County, on the farm of J. Benson Posey; La Plata, Charles County, on the farm of J. Marshall Chapman; Browningsville, Montgomery County, on the farm of Joseph M. Burdette; and Leonardtown, St. Mary's County, on the farm of George F. Pabst. At these places, one (1) acre of land was selected and divided into ten (10) equal plats, each receiving a different application of

fertilizer. The plats were all planted and cultivated at the same time and in the same manner. The plants used were the varieties common to the respective sections.

The thanks of the State and myself are due the several gentlemen named above for the interest which they have taken in these experiments, and for the many courtesies which they have extended to us throughout the year.

The curing by the flue system was conducted in Calvert and Charles counties. We placed at each point a man expert in the management of flue barns, and, had the season been more favorable for the maturing of tobacco, it is believed that we would have had very happy returns from the process; as it was, we have had manifestations and many expressions of satisfaction that the method was an improvement, and progressive farmers are strong in the belief that Maryland producers must resort to flue-curing if they are going to continue to raise tobacco successfully and at a profit, and that they can no longer rely on the uncertainties of the weather, which they are subjected to in air-curing.

The results and indications which our experiments have given so far, I think, will warrant their being continued much after the plan of last year.

There have been no material changes or additions made in the equipment of the laboratory during this year.

The result of the work and investigations conducted by this department will be reported from time to time, as desired, for publication in the bulletins of the Station.

H. J. PATTERSON, B. S.

*Chemist.*

## REPORT OF THE DEPARTMENT OF HORTICULTURE.

*To Robert H. Miller, Director:*

DEAR SIR:—I herewith have the honor to report on the character and extent of the work of this division for the year 1892.

In this department the year was one of disappointment. With the orchard fruits, the failure was complete. Many of the buds were apparently winter-killed; a late Spring frost at the critical time of bloom shortened the expectation, and the severe hail storm in June completed the failure of the orchard crops. While the failure of the small fruits were not so complete, the effect of the late frost, the hail storm, and the subsequent drought was shown by a crop small in yield and poor in quality.

A variety test with watermelons and cantaloupes was undertaken, to test earliness of maturity, and such other characteristics of merit as would commend them to those interested in their culture. These were more unfavorably affected by the weather conditions already recited than even the small fruits; and, therefore, the results are not considered as indicative. The experiment will be continued, we hope, under more favorable auspices, and the results given for general information.

Experimental tests were made with tomatoes on two lines of investigation. First—Thirty-three varieties were tested as to earliness of maturity as well as gross yield. Second—Twenty-two experiments as to value of different fertilizers. The results have been given in the regular December bulletin, No. 19.

Fruit culture has become one of the most important industries of the State. The disappointment of the year in regard to the failure of the orchard fruits was, unfortunately, not limited to the experience of the Experiment Station. The current year has been one of very general disappointment to the orchardists of Maryland. In the Eastern and Southwestern sections of the State, the growing of peaches engages the at-

tention of many of the people. In these localities, many orchards failed entirely. In others the yield was small and generally not up to the standard, either as to size or quality. The growers of Western Maryland were more fortunate as regards both quantity and quality of crop. In this section, the fruit industry is of later introduction, and more attention is given to the trimming and cultivation of the trees.

It might not be uninteresting to take note of those conditions other than climatic that may have in a large measure contributed to the general failure of the peach crop in the season of 1892.

It will be remembered that the crop of 1891 was a very heavy one, taxing the trees to their utmost; and that on account of a protracted drought in the late Summer and early Fall, the conditions were not favorable to the maturity of the buds. During the Winter of 1891 and 1892, a short fruit crop was generally predicted by the farmers, because, as stated, so large a per cent. of the buds appeared to be winter-killed; and yet the Winter of 1891-1892 was comparatively a very mild one. This condition of the buds was noticeable after a very slight freeze early in November of 1891, and therefore the immaturity of the buds would seem to explain this much of the failure?

It is well ascertained that during the short growing period, not only are the energies of the trees heavily taxed for the maturity of the current crop, but provision must at the same time be made for the growth and development of the buds, which are to constitute the basis of expectation for the succeeding year. Nature seems to point a suggestion. The perfect seed not only contains the embryonic plantlet, but also the food supply to sustain it, until its draft on the elements of earth and air can be honored. The same conditions of stored food supply can be found at the base of every perfectly matured and developed bud. What is the June fall but "the survival of the fittest?" The question pertinently suggests itself—how might the orchardist promote the bud development? First, by judicious pruning, as a guard against overbearing; secondly, by sufficient culture to keep the trees in vigorous growth, and in some way to make good the deficiency of the special elements drafted on during the whole life of the orchard.



In the experimental orchard at this Station, the value of the crimson clover as a fertilizing agent will be tested under the following conditions: The orchard will be kept thoroughly cultivated until a favorable time in July or August, for sowing the clover, and carefully seeded; and the cultivation of the unsown alternate row will be continued until the clover is plowed down the following Spring.

The cultivation of the unsown rows should be thorough and frequent, to insure vigorous growth of the trees, and as a safeguard against the effects of the droughts which frequently prevail at the critical time of the bud development. We believe this practice would be in the line of nature's suggestions, and would well repay the additional cost and labor.

That part of the orchard not sown to clover will be similarly treated in every other particular and the results given.

JAMES S. ROBINSON,

*Horticulturist.*



## THE ANNUAL FINANCIAL REPORT, 1891-1892.

*The Maryland Agricultural Experiment Station in Account with the United States Appropriation.*

1892.

DR.

June 30.	To Receipts from the Treasurer of the United States in four payments, per appropriation for the year ending June 30, 1892, under Act of Congress, approved March 2, 1887.....	\$15,000 00	
			\$15,000 00

1892.	CREDITS.	LEDGER PAGE.	AMT.	
June 30.	By Salaries .....	208	\$6,282 50	
"	Labor.....	222	2,417 75	
"	Supplies. ....	233	1,341 53	
"	Tobacco Experiments.....	237	819 75	
"	Freight and Express.....	243	227 01	
"	Postage and Stationery.....	246	82 52	
"	Printing and Office Expenses..	250	1,306 29	
"	Library.....	254	363 41	
"	Tools and Implements ..	258	206 08	
"	Buildings .....	279	749 50	
"	Fencing and Drainage.....	284	85 00	
"	Exhibitions and Meetings ....	311	296 32	
"	Travel and Board Meetings...	321	302 67	
"	Feeding Experiments.....	317	131 00	
"	Soil Experiments.....	331	389 67	
				\$15,000 00

I hereby certify that the foregoing is a true transcript from the books of account of the Maryland Agricultural Experiment Station, for the fiscal year ending June 30, 1892.

JOS. R. OWENS, *Registrar and Treasurer.*

We, the undersigned, duly appointed Auditors for the corporation, do hereby certify that we have examined the books and accounts of the Maryland Agricultural Experiment Station, for the fiscal year ending June 30, 1892, that we have found the same well kept and correctly classified as above, that the receipts are shown to have been \$15,000.00, and the corresponding disbursements \$15,000.00, for all of which proper vouchers are on file, and having been examined by us are found correct.

(Signed:)

CHARLES B. CALVERT,	} <i>Auditors.</i>
J. P. SILVER,	
W. T. BIEDLER.	





